

Work Order ID 85987

85987

Page 1

June-19-12 1:16:20 PM

Item ID: D412-664-203TRN

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Turning Detail

Start Date: 19/06/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 03/07/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: MLJ

Date: 12/06/19

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start ***NR1***

Stop ***NR2***

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

Draw Nbr

Revision Nbr

D412-664-243

Rev E(DEO)

100

0.00

100

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA166

2-Turn first side as per Folio FA166

3- File transition lines smooth.

FOLIO REV: AA

DWG REV: E

man.l
12/07/19

110

QC1- Inspect dimensions to dimension sheet

0.00

110

QC

Memo

0.00

Quality Control

man.l
12/07/19

NCR: Yes / No

WORK ORDER NON-CONFORMANCE / UPDATE

DQA: _____ Date: _____

QA Closed: _____ Date: _____

| | | | | | | | | | | | | | | | | | | |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------|--------------------------------------------|--------------------------------------|------------------------------------|------------------------------------|----------------------------------------------|----------------------------------|----------------------------------------|------------------------------------|-----------------------------------|--|------------------------------------|------------------------------------|--------------------------------|--|
| Work Order: _____ Part No. _____ NCR No. _____ | DISPOSITION Rework <input type="checkbox"/> Scrap <input type="checkbox"/> Use-as-is <input type="checkbox"/> Work Order Update <input type="checkbox"/> | AGAINST DEPARTMENT/PROCESS <table style="width:100%;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Crosstube <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/> | Crosstube <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Supplier <input type="checkbox"/> | | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Other <input type="checkbox"/> | |
| Skid-tube <input type="checkbox"/> | Crosstube <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Engineering <input type="checkbox"/> | | | | | | | | | | | | | | | |
| Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Quality <input type="checkbox"/> | | | | | | | | | | | | | | | |
| Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Supplier <input type="checkbox"/> | | | | | | | | | | | | | | | | |
| Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Other <input type="checkbox"/> | | | | | | | | | | | | | | | | |

| Root Cause | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|----------------------------------------|------|------|-----|-----------------------------------------------------|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data <input type="checkbox"/> | | | | | | | | | |
| Equip/Tooling <input type="checkbox"/> | | | | | | | | | |
| Operator <input type="checkbox"/> | | | | | | | | | |
| Material <input type="checkbox"/> | | | | | | | | | |
| Offset/Setup <input type="checkbox"/> | | | | | | | | | |
| Other <input type="checkbox"/> | | | | | | | | | |
| Process <input type="checkbox"/> | | | | | | | | | |
| Supplier <input type="checkbox"/> | | | | | | | | | |
| Training <input type="checkbox"/> | | | | | | | | | |
| Unauthorized <input type="checkbox"/> | | | | | | | | | |

FAULT CATEGORY

| Landing Gear | Hardware | General | Maintenance |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Bending Passes Below Min <input type="checkbox"/> Centre Not Concentric to O/S <input type="checkbox"/> Cracks <input type="checkbox"/> Crushed/Crimp at Bending <input type="checkbox"/> Inspection Strip in Tube <input type="checkbox"/> Other <input type="checkbox"/> Positioned Wrong <input type="checkbox"/> Ripples on Inner Bend <input type="checkbox"/> Torque Waves in Extrusion <input type="checkbox"/> Turning Sequence <input type="checkbox"/> Wave/Twist in Tube | <input type="checkbox"/> Breaking <input type="checkbox"/> Missing <input type="checkbox"/> Size/Length <input type="checkbox"/> Spinning <input type="checkbox"/> Threading <input type="checkbox"/> Wrong Drill Holes <input type="checkbox"/> Misaligned <input type="checkbox"/> Ovalized <input type="checkbox"/> Over/Undersized <input type="checkbox"/> Too Many | <input type="checkbox"/> Burrs <input type="checkbox"/> Contamination <input type="checkbox"/> Cut Too Short <input type="checkbox"/> Documentation/Data <input type="checkbox"/> Finish <input type="checkbox"/> Inspection Incomplete <input type="checkbox"/> Inspection Unqualified <input type="checkbox"/> Instructions Incomplete/Unclear <input type="checkbox"/> Jigs/Fixtures/Tooling <input type="checkbox"/> Kit Incorrect <input type="checkbox"/> Kit Missing | <input type="checkbox"/> Maintenance <input type="checkbox"/> Mislabeled <input type="checkbox"/> Off-Set <input type="checkbox"/> Orientation Misread <input type="checkbox"/> Out of Calibration <input type="checkbox"/> Out of Sequence <input type="checkbox"/> Outside Dimensions <input type="checkbox"/> Over/Under tolerance <input type="checkbox"/> Part Lost <input type="checkbox"/> Part Moved <input type="checkbox"/> Raw Material |
| | | | <input type="checkbox"/> Set-up <input type="checkbox"/> Supplier <input type="checkbox"/> Temperature/Cure <input type="checkbox"/> Weld <input type="checkbox"/> Wrong Stock Pulled <input type="checkbox"/> Other |

Work Order ID 85987

85987

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Item ID: D412-664-203TRN

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Turning Detail

Start Date: 19/06/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 03/07/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start ***NR1***

QC:

Date:

SPC (Y/N):

Date:

Stop ***NR2***

| Sequence ID/ Work Center ID | Operation Description | Set Up/ Run Hours | Tool ID | Tool # | Plan Code | Accept Qty | Reject Qty | Reject Number | Insp. Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

145

0.00

145

Crosstubes

Memo

0.00

Crosstubes

GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.

Rm 12-7-19

150

Crosstubes Chemical Conversion

0.00

150

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

*1- Pressure Wash
2- Acid Etch.
12-07-20*

Rm 12-7-20

160

QC-Inspect Chemical Conversion Coat

0.00

160

QC

Memo

0.00

Quality Control

12-7-23



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: Date:

| | | | | | | | | | | |
|--------------------------------------------------------------|-------------------|--------------------------|----------------------------|--------------------------|-----------|--------------------------|---------------------|--------------------------|-------------|--------------------------|
| Work Order: _____ Part No. _____ NCR No. _____ | DISPOSITION | | AGAINST DEPARTMENT/PROCESS | | | | | | | |
| | Rework | <input type="checkbox"/> | Skid-tube | <input type="checkbox"/> | Crosstube | <input type="checkbox"/> | Prod. Eng. Coord. | <input type="checkbox"/> | Engineering | <input type="checkbox"/> |
| | Scrap | <input type="checkbox"/> | Machining | <input type="checkbox"/> | Small Fab | <input type="checkbox"/> | Rec/Store/Packaging | <input type="checkbox"/> | Quality | <input type="checkbox"/> |
| | Use-as-is | <input type="checkbox"/> | Thermoforming | <input type="checkbox"/> | Finishing | <input type="checkbox"/> | Supplier | <input type="checkbox"/> | | <input type="checkbox"/> |
| | Work Order Update | <input type="checkbox"/> | Large Fab | <input type="checkbox"/> | Composite | <input type="checkbox"/> | Other | <input type="checkbox"/> | | <input type="checkbox"/> |

[illegible]

Landing Gear

| | |
|--------------------------|------------------------------|
| <input type="checkbox"/> | Bending Passes Below Min |
| <input type="checkbox"/> | Centre Not Concentric to O/S |
| <input type="checkbox"/> | Cracks |
| <input type="checkbox"/> | Crushed/Crimp at Bending |
| <input type="checkbox"/> | Inspection Strip in Tube |
| <input type="checkbox"/> | Other |
| <input type="checkbox"/> | Positioned Wrong |
| <input type="checkbox"/> | Ripples on Inner Bend |
| <input type="checkbox"/> | Torque Waves in Extrusion |
| <input type="checkbox"/> | Turning Sequence |
| <input type="checkbox"/> | Wave/Twist in Tube |

Hardware

| | |
|--------------------------|-------------|
| <input type="checkbox"/> | Breaking |
| <input type="checkbox"/> | Missing |
| <input type="checkbox"/> | Size/Length |
| <input type="checkbox"/> | Spinning |
| <input type="checkbox"/> | Threading |
| <input type="checkbox"/> | Wrong |

Drill Holes

| | |
|--------------------------|-----------------|
| <input type="checkbox"/> | Misaligned |
| <input type="checkbox"/> | Ovalized |
| <input type="checkbox"/> | Over/Undersized |
| <input type="checkbox"/> | Too Many |

General

| | |
|--|---------------------------------|
| | Burrs |
| | Contamination |
| | Cut Too Short |
| | Documentation/Data |
| | Finish |
| | Inspection Incomplete |
| | Inspection Unqualified |
| | Instructions Incomplete/Unclear |
| | Jigs/Fixtures/Tooling |
| | Kit Incorrect |
| | Kit Missing |

| | |
|--|----------------------|
| | Maintenance |
| | Mislabeled |
| | Off-Set |
| | Orientation Misread |
| | Out of Calibration |
| | Out of Sequence |
| | Outside Dimensions |
| | Over/Under tolerance |
| | Part Lost |
| | Part Moved |
| | Raw Material |

- ☐ Set-up
- ☐ Supplier
- ☐ Temperature/Cure
- ☐ Weld
- ☐ Wrong Stock Pulled
- ☐ Other

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Item ID: D412-664-203TRN

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Turning Detail

Start Date: 19/06/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 03/07/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start ***NR1***

QC:

Date:

SPC (Y/N):

Date:

Stop ***NR2***

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

170

0.00

170

Packaging

Packaging

Memo

0.00

Identify and stock in kanban rack
Location: LG

MO 12-7-23

180

QC21- Final Inspection - Work Order Release

0.00

180

QC

Memo

0.00

Quality Control

12/7/23 JF

MF 12-07-23

Picklist Print

June-19-12 1:16:24 PM

Page 1

Work Order ID: 85987

85987

Parent Item: D412-664-203TRN

D412-664-203TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 19/06/2012

Required Date: 03/07/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec
IPP Rev B 08.04.02 Removed polish EC verified by: DD

| Component Item ID/ Item Name | Replacement Item ID | Mfg/ Purch | Bin Item | Primary Location | Last Location | Route Seq ID | Unit of Measure | Qty on Hand | Qty per Kit | Total Qty | Qty Issued | Date Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6009-129 | | Manufactured | No | | | 120 | Each | 19.0000 | 1 | 1 | | | |

D6009-129

Crosstube Material

**

Location

Loc Qty

Loc Code

LG

19

19

69801

9mm.L 12/07/14

NCR: Yes / No

WORK ORDER NON-CONFORMANCE / UPDATE

DQA: _____ Date: _____

QA Closed: _____ Date: _____

| | | | | | | | | | | | | | | | | | | |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------|--------------------------------------------|--------------------------------------|------------------------------------|------------------------------------|----------------------------------------------|----------------------------------|----------------------------------------|------------------------------------|-----------------------------------|--|------------------------------------|------------------------------------|--------------------------------|--|
| Work Order: _____ Part No. _____ NCR No. _____ | DISPOSITION Rework <input type="checkbox"/> Scrap <input type="checkbox"/> Use-as-is <input type="checkbox"/> Work Order Update <input type="checkbox"/> | AGAINST DEPARTMENT/PROCESS <table style="width:100%; border: none;"> <tr> <td style="width:15%;">Skid-tube <input type="checkbox"/></td> <td style="width:15%;">Crosstube <input type="checkbox"/></td> <td style="width:15%;">Prod. Eng. Coord. <input type="checkbox"/></td> <td style="width:15%;">Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/> | Crosstube <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Supplier <input type="checkbox"/> | | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Other <input type="checkbox"/> | |
| Skid-tube <input type="checkbox"/> | Crosstube <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Engineering <input type="checkbox"/> | | | | | | | | | | | | | | | |
| Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Quality <input type="checkbox"/> | | | | | | | | | | | | | | | |
| Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Supplier <input type="checkbox"/> | | | | | | | | | | | | | | | | |
| Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Other <input type="checkbox"/> | | | | | | | | | | | | | | | | |

| Root Cause | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|----------------------------------------|------|------|-----|-----------------------------------------------------|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data <input type="checkbox"/> | | | | | | | | | |
| Equip/Tooling <input type="checkbox"/> | | | | | | | | | |
| Operator <input type="checkbox"/> | | | | | | | | | |
| Material <input type="checkbox"/> | | | | | | | | | |
| Offset/Setup <input type="checkbox"/> | | | | | | | | | |
| Other <input type="checkbox"/> | | | | | | | | | |
| Process <input type="checkbox"/> | | | | | | | | | |
| Supplier <input type="checkbox"/> | | | | | | | | | |
| Training <input type="checkbox"/> | | | | | | | | | |
| Unauthorized <input type="checkbox"/> | | | | | | | | | |

FAULT CATEGORY

| | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Landing Gear <input type="checkbox"/> Bending Passes Below Min <input type="checkbox"/> Centre Not Concentric to O/S <input type="checkbox"/> Cracks <input type="checkbox"/> Crushed/Crimp at Bending <input type="checkbox"/> Inspection Strip in Tube <input type="checkbox"/> Other <input type="checkbox"/> Positioned Wrong <input type="checkbox"/> Ripples on Inner Bend <input type="checkbox"/> Torque Waves in Extrusion <input type="checkbox"/> Turning Sequence <input type="checkbox"/> Wave/Twist in Tube | Hardware <input type="checkbox"/> Breaking <input type="checkbox"/> Missing <input type="checkbox"/> Size/Length <input type="checkbox"/> Spinning <input type="checkbox"/> Threading <input type="checkbox"/> Wrong Drill Holes <input type="checkbox"/> Misaligned <input type="checkbox"/> Ovalized <input type="checkbox"/> Over/Undersized <input type="checkbox"/> Too Many | General <input type="checkbox"/> Burrs <input type="checkbox"/> Contamination <input type="checkbox"/> Cut Too Short <input type="checkbox"/> Documentation/Data <input type="checkbox"/> Finish <input type="checkbox"/> Inspection Incomplete <input type="checkbox"/> Inspection Unqualified <input type="checkbox"/> Instructions Incomplete/Unclear <input type="checkbox"/> Jigs/Fixtures/Tooling <input type="checkbox"/> Kit Incorrect <input type="checkbox"/> Kit Missing | <input type="checkbox"/> Maintenance <input type="checkbox"/> Mislabeled <input type="checkbox"/> Off-Set <input type="checkbox"/> Orientation Misread <input type="checkbox"/> Out of Calibration <input type="checkbox"/> Out of Sequence <input type="checkbox"/> Outside Dimensions <input type="checkbox"/> Over/Under tolerance <input type="checkbox"/> Part Lost <input type="checkbox"/> Part Moved <input type="checkbox"/> Raw Material <input type="checkbox"/> Set-up <input type="checkbox"/> Supplier <input type="checkbox"/> Temperature/Cure <input type="checkbox"/> Weld <input type="checkbox"/> Wrong Stock Pulled <input type="checkbox"/> Other |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

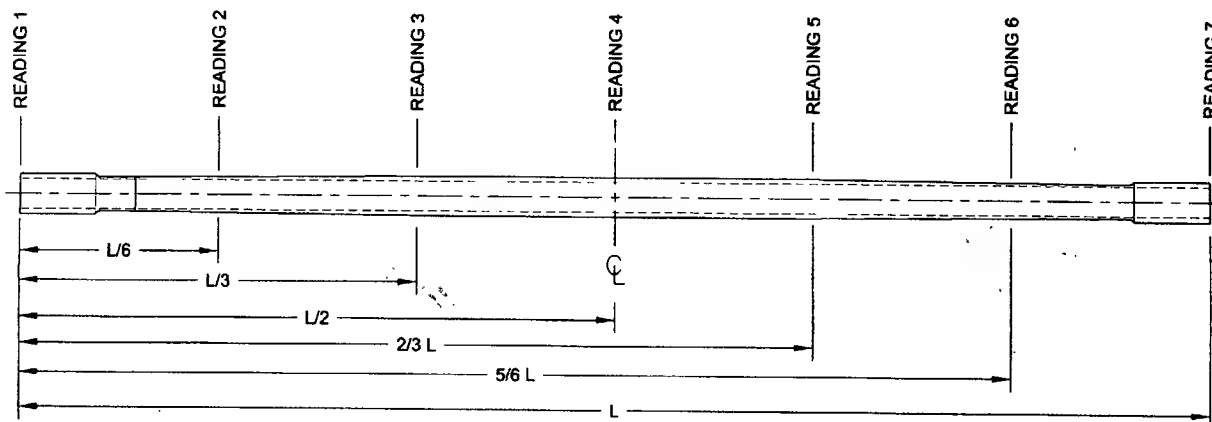
| | | | |
|-------------------------------------------------------|--|---------------------|--------------|
| DART AEROSPACE LTD | | Work Order: | 85987 |
| Description: Crosstube Assembly (412 High Aft) | | Part Number: | D412-664-243 |
| Inspection Dwg: D412-664-243 Rev: E | | Page 1 of 2 | |

FIRST ARTICLE INSPECTION CHECKLIST

| | Inspection Sheet Drawing Dimension | Tolerance | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|--------|---------------------------------------|---------------|---------------------|--------|--------|-------------------------|----------|
| SIDE A | 2.684 | +0.005/-0.000 | 2.688 | ✓ | | vern | CWC-08 |
| | 2.748 | +0.005/-0.000 | 2.753 | ✓ | | | |
| | 2.884 | +0.005/-0.000 | 2.889 | ✓ | | | |
| | 3.019 | +0.005/-0.000 | 3.024 | ✓ | | | |
| | 3.163 | +0.005/-0.000 | 3.167 | ✓ | | | |
| | 3.308 | +0.005/-0.000 | 3.312 | ✓ | | | |
| | 3.429 | +0.005/-0.000 | 3.430 | ✓ | | | |
| | 2.990 | +0.005/-0.000 | 2.993 | ✓ | | | |
| | 2.618 | +0.005/-0.000 | 2.623 | ✓ | | ↓ | |
| | 0.200 | +/-0.010 | .200 | - | | vern | CWC-08 |
| | R0.063 | +/-0.010 | .063 | - | | RG | |
| | R0.500 | +/-0.010 | .500 | - | | " | |
| | 4.971 | +/-0.030 | 4.971 | ✓ | | vern | CWC-08 |
| | | | | | | | |
| | | | | | | | |
| SIDE B | 2.684 | +0.005/-0.000 | 2.685 | ✓ | | vern | CWC-08 |
| | 2.748 | +0.005/-0.000 | 2.751 | ✓ | | | |
| | 2.884 | +0.005/-0.000 | 2.888 | ✓ | | | |
| | 3.019 | +0.005/-0.000 | 3.023 | ✓ | | | |
| | 3.163 | +0.005/-0.000 | 3.165 | ✓ | | | |
| | 3.308 | +0.005/-0.000 | 3.312 | ✓ | | | |
| | 3.429 | +0.005/-0.000 | 3.430 | ✓ | | | |
| | 2.990 | +0.005/-0.000 | 2.993 | ✓ | | | |
| | 2.618 | +0.005/-0.000 | 2.621 | ✓ | | ↓ | |
| | 0.200 | +/-0.010 | .200 | - | | vern | CWC-08 |
| | R0.063 | +/-0.010 | .063 | - | | RG | |
| | R0.500 | +/-0.010 | .500 | - | | " | |
| | 4.971 | +/-0.030 | 4.971 | ✓ | | vern | CWC-08 |
| | 124.100 | +/-0.020 | 124.100 | ✓ | | tape | LG-22 |
| | | | | | | | |
| | | | | | | | |

| | |
|-------------------------------------------------------|----------------------------------|
| DART AEROSPACE LTD | Work Order: 85987 |
| Description: Crosstube Assembly (412 High Aft) | Part Number: D412-664-243 |
| Inspection Dwg: D412-664-243 Rev: E | Page 2 of 2 |

WALL THICKNESS MEASUREMENT



| Location | WALL THICKNESS MEASUREMENT (IN) | | | | Deviation Δw (max-min) | TOLERANCE |
|--------------------|---------------------------------|------|------|------|--------------------------------------|-----------|
| | w1 | w2 | w3 | w4 | | |
| READING 1 L= 0" | .374 | .371 | .373 | .376 | .005 | 0.073" |
| READING 2 L= 19 | .306 | .299 | .293 | .298 | .013 | |
| READING 3 L= 39 | .466 | .457 | .459 | .463 | .009 | |
| READING 4 L= 62 | .626 | .629 | .629 | .631 | .005 | |
| READING 5 L= 39 | .459 | .462 | .463 | .461 | .004 | |
| READING 6 L= 19 | .289 | .309 | .309 | .290 | .020 | |
| READING 7 L= 62 | .371 | .387 | .381 | .358 | .031 | |

Calibration Result

Actual Block Thickness: _____

Sitescan 250 Measured Thickness: _____

Measured by: gmm.l
Date: 12/07/16

Audited by: [Signature]
Date: 12-7-16

Preliminary Approval: _____
Date: _____

| Rev | Date | Change | Revised by | Approved |
|-----|----------|---------------------------------------|------------|-------------|
| A | 04.06.16 | New Issue (P/O D412-664-203) | KJ/JLM | |
| B | 06.03.09 | Dwg Rev updated | KJ/JLM | |
| C | 07.05.08 | Tolerance updated for dimension 4.971 | KJ/JLM | |
| D | 10.02.02 | Dimension 124.100 was 124.09 | KJ | |
| E | 12.06.04 | Wall thickness form added | KJ | [Signature] |

| Item | Qty -243 | Part Number | Description |
|------|-------------|----------------|--------------------------------------------------------------------------------------------------------------|
| 1 | X | D412-664-243 | CROSSTUBE ASSEMBLY (412 HIGH AFT) |
| 2 | 1 | D6009-129 | CROSSTUBE |
| 3 | 2 | D3595-063-570 | RUBBER CUSHION |
| 4 | 1 | D2896-1 | SUPPORT |
| 5 | 2 | D3189-1 | CHAFING SHIELD |
| 6 | 2 | D2856-600-1009 | ABRASION STRIP |
| 7 | 4 | MS21920-28 | CLAMP |
| 8 | 2 | MS21920-30 | CLAMP (OR MS21920-32) |
| 9 | A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC 299-947-100, TYPE II, CLASS 2 ADHESIVE) |

GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6009-129
FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING/TRIMMING)
- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D412-664-243" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- WEIGHT: 47.0 lbs (PER IIN-D212-664)
- PART IS SYMMETRIC ABOUT CENTERLINE.
- RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH
- BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- TORQUE CLAMPS 80 TO 100 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

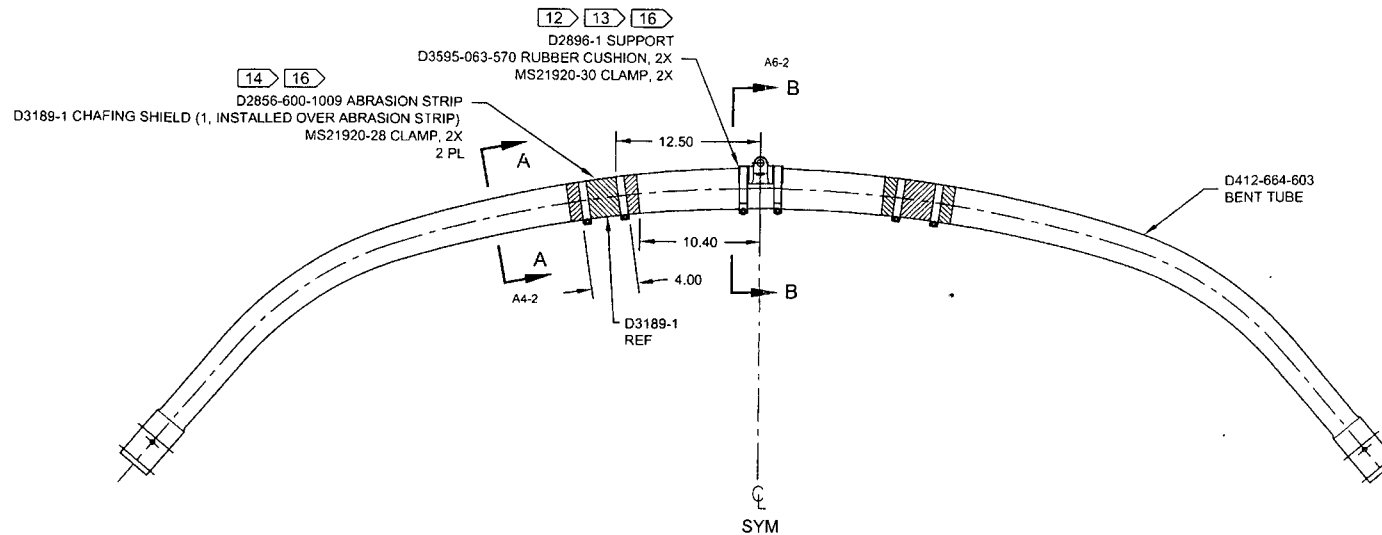
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RETURN TO
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WORK ORDER
NO. 85987 MLJ

12/06/19

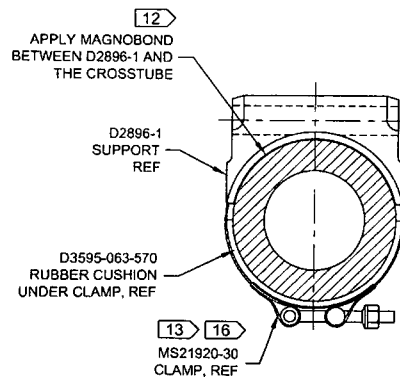
② DEO ATTACHED

RELEASED
2009-10-29

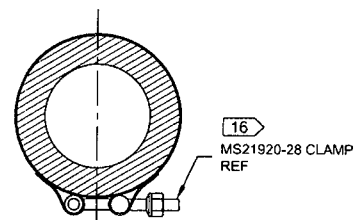
| | | | |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| E | REFORMAT/REVISE GENERAL NOTES; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); ADD TOLERANCE (ZN B6-3, C4-3, C8-3 & C5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4. | RF | 09.09.30 |
| D | REMOVE D2732-058, CHANGE TO D3595-063-570 | PH | 07.03.09 |
| C | REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398, MS21920-32 WAS MS21920-30 | MB | 06.10.27 |
| B | ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES | PH | 05.02.04 |
| A | NEW ISSUE | PH | 01.10.17 |
| REV. | DESCRIPTION | BY | DATE |
| DESIGN | PH | DART AEROSPACE LTD | |
| DRAWN | RF | HAWKESBURY, ONTARIO, CANADA | |
| CHECKED | PH | DRAWING NO. | REV. E |
| MFG. APPR. | PH | D412-664-243 | SHEET 1 OF 4 |
| APPROVED | PH | TITLE | SCALE |
| DE APPR. | PH | CROSSTUBE ASSEMBLY (412 HI AFT) | NTS |
| DATE | 09.09.30 | COPYRIGHT © 2001 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL. WHO IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD. | |



D212-664-243
ASSEMBLY DETAIL



SECTION B-B D4-2
SCALE 4X

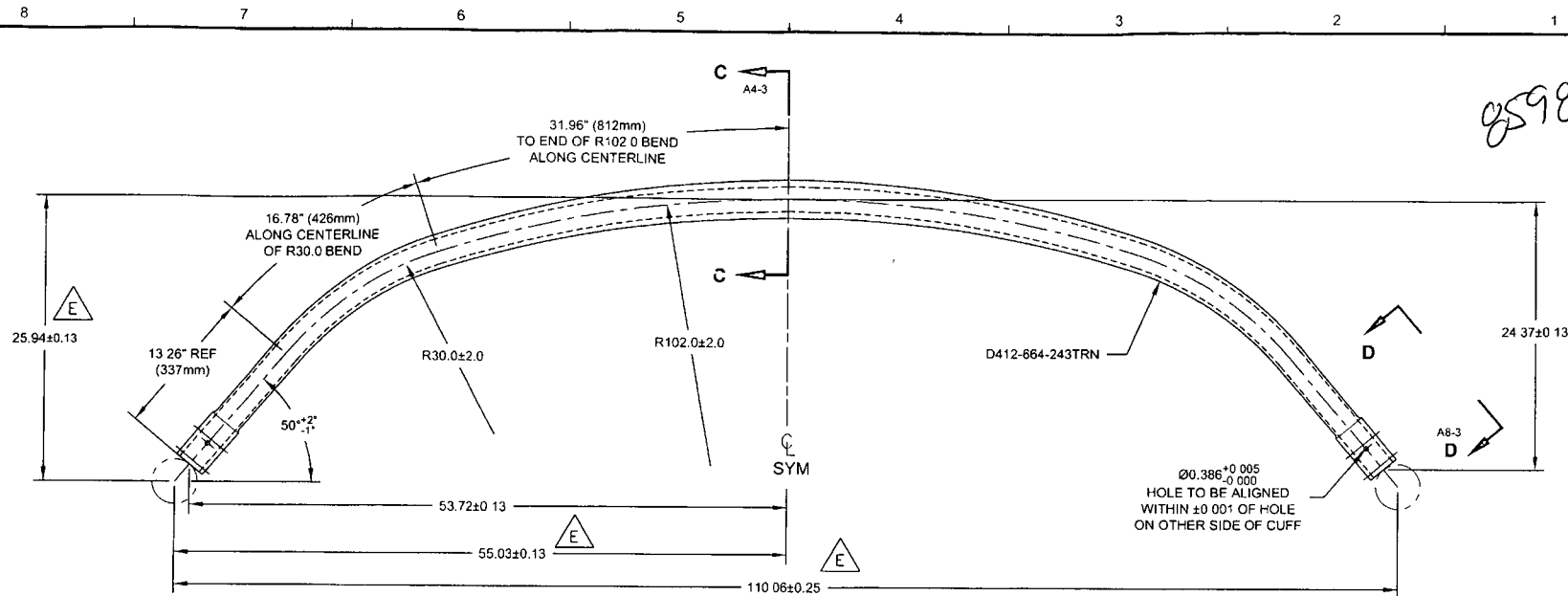


SECTION A-A C6-2
SCALE 4X

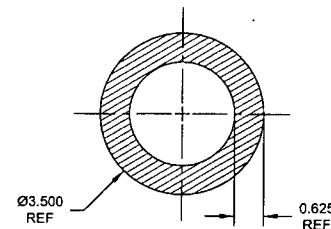
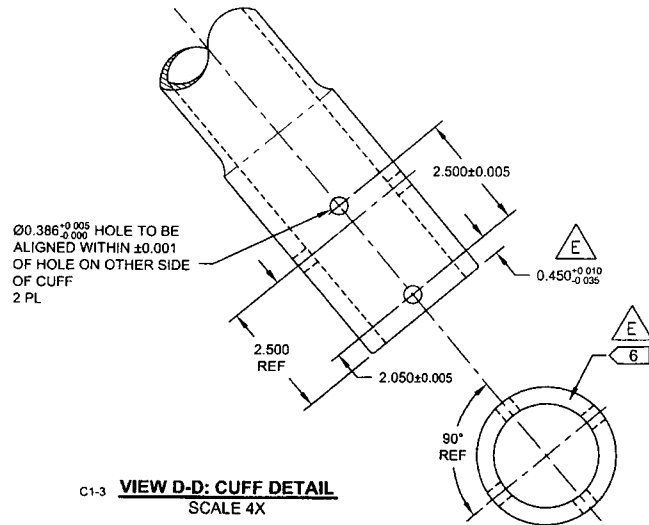
2 DEO ATTACHED

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2009-10-28
NRP

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------|--------------|
| DESIGN | PH | DART AEROSPACE LTD | |
| DRAWN | RF | HAWKESBURY, ONTARIO, CANADA | |
| CHECKED | 92 | DRAWING NO. | REV. E |
| MFG. APPR. | 18 | D412-664-243 | SHEET 2 OF 4 |
| APPROVED | 19 | TITLE | SCALE |
| DE APPR. | 11 | CROSSTUBE ASSEMBLY (412 HI AFT) | NTS |
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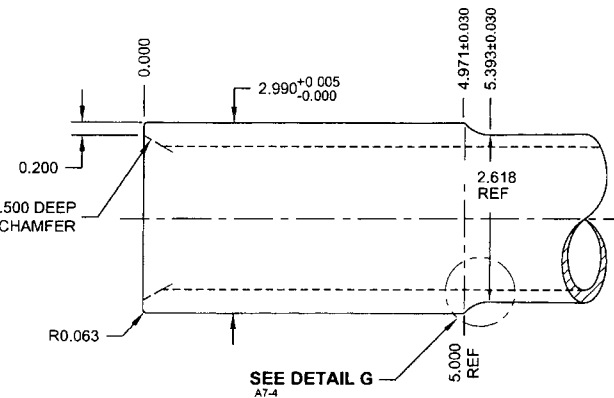
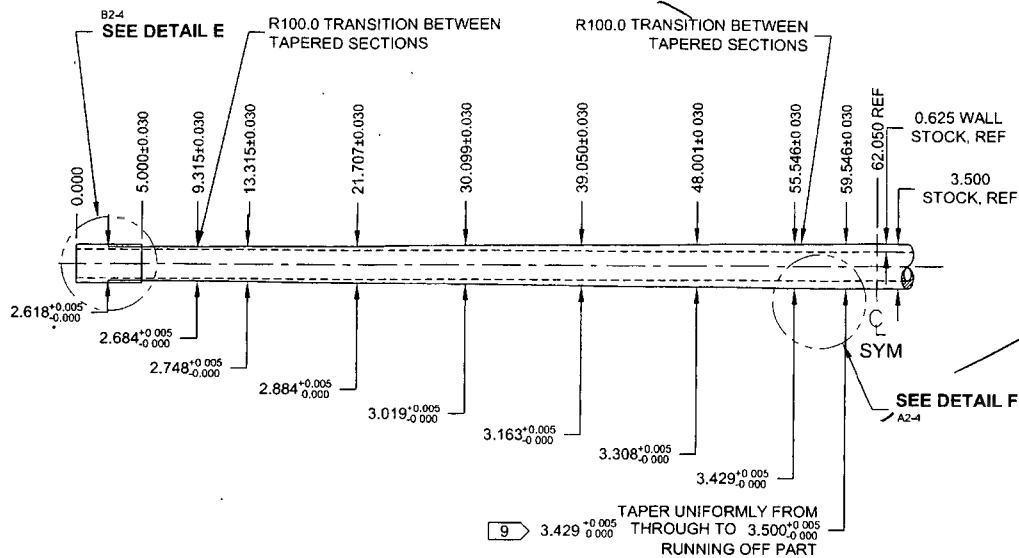


D412-664-603 10
BENDING AND DRILLING DETAIL E



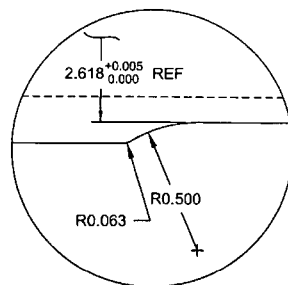
② DEO ATTACHED
RELEASED
 2009-10-29
 MP

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| DESIGN | PH | DART AEROSPACE LTD | |
| DRAWN | RF | HAWKESBURY, ONTARIO, CANADA | |
| CHECKED | 92 | DRAWING NO. | REV. E |
| MFG. APPR. | SS | D412-664-243 | SHEET 3 OF 4 |
| APPROVED | AP | TITLE | SCALE |
| DE APPR. | 4 | CROSSTUBE ASSEMBLY (412 HI AFT) | NTS |
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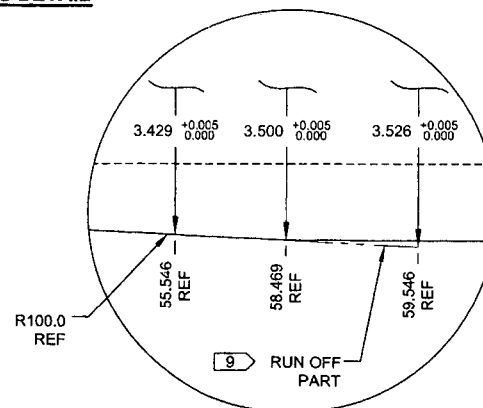


DETAIL E:
CROSSTUBE CUFF D8-4
SCALE 5X

D412-664-243TRN
TURNING DETAIL



DETAIL G:
CUFF TRANSITION C2-4
SCALE 10X



DETAIL F:
TAPER RUN-OFF C4-4
NOT TO SCALE

2 DEO ATTACHED

RELEASED
2009-10-29

| | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------|--------------|
| DESIGN | PH | DART AEROSPACE LTD | |
| DRAWN | RF | HAWKESBURY, ONTARIO, CANADA | |
| CHECKED | 9 | DRAWING NO. | REV. E |
| MFG. APPR. | 10 | D412-664-243 | SHEET 4 OF 4 |
| APPROVED | 11 | TITLE | SCALE |
| DE APPR. | 12 | CROSSTUBE ASSEMBLY (412 HI AFT) | NTS |
| DATE | 09.09.30 | COPYRIGHT © 2001 BY DART AEROSPACE LTD | |
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| | | | | | | | |
|-----------------------------|------------------------------------------|---------------------|-----------------------------------------|-------------------|--------------------------------|---------------------------|--------------|
| DRAWING NO. D412-664-243 | TITLE CROSSTUBE ASSEMBLY (412 HI AFT) | REV. E | DART AEROSPACE LTD ENGINEERING ORDER | | D.E.O. NO. D412-664-243-E-1 | SHEET NO. SHEET 1 OF 2 | SCALE NTS |
| DRAWN | CHECKED <i>MP</i> | MFG. APPR. <i>E</i> | APPROVED <i>MP</i> | DE APPR. <i>#</i> | | | |
| DATE 11.03.31 | DATE 11/03/31 | DATE 11.03.31 | DATE 11/03/31 | DATE 11-03-31 | | | |

PURPOSE:

REMOVED ABRASION STRIP IN FAVOR OF A THIN LAYER OF PROSEAL 890.

CHANGE:

PARTS LIST IS AMENDED AS FOLLOWS:

IS:

| Item | Qty -243 | Part Number | Description |
|------|-------------|----------------|----------------|
| 6 | 0 | D2856-600-1009 | ABRASION STRIP |

WAS:

| | | | |
|---|---|----------------|----------------|
| 6 | 2 | D2856-600-1009 | ABRASION STRIP |
|---|---|----------------|----------------|

NOTES 2 AND 14, SHEET 1 ARE AMENDED AS FOLLOWS:

IS:

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, APPLY CLEAR COAT ON HATCHED AREA
- 14) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1
CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL
PROSEALED D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF
PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.

WAS:

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF
CROSSTUBE PER QSI 035.

RELEASED
2011-04-07
MP

| | | | | | | |
|-----------------------------|------------------------------------------|-------------------------------|-----------------------------------------|--------------------------------|---------------------------|--------------|
| DRAWING NO. D412-664-243 | TITLE CROSSTUBE ASSEMBLY (412 HI AFT) | REV. E | DART AEROSPACE LTD ENGINEERING ORDER | D.E.O. NO. D412-664-243-E-1 | SHEET NO. SHEET 2 OF 2 | SCALE NTS |
| DRAWN <i>[Signature]</i> | CHECKED <i>[Signature]</i> | MFG. APPR. <i>[Signature]</i> | APPROVED <i>[Signature]</i> | DE APPR. <i>[Signature]</i> | | |
| DATE 11.03.31 | DATE 11.03.31 | DATE 11.03.31 | DATE 11.03.31 | DATE 11.03.31 | | |

IS:

D3189-1 CHAFING SHIELD (1, INSTALLED OVER PROSEAL 890)
MS21920-28 CLAMP, 2X
2 PL

D412-664-603
BENT TUBE

2.00
1.00

WAS:

D2856-600-1009 ABRASION STRIP
D3189-1 CHAFING SHIELD (1, INSTALLED OVER ABRASION STRIP)
MS21920-28 CLAMP, 2X
2 PL

D3189-1
REF

**D412-664-243
ASSEMBLY DETAIL**

MASK AREA PRIOR TO PAINTING AND
APPLY CLEAR COAT AFTER PAINTING

2.00

C
SYM

RELEASED
2011-04-07
[Signature]

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| | | | | | | | |
|-----------------------------|---------------------------------------|-------------------------|-------------------------------------------------|--|--------------------------------|---------------------------|--------------|
| DRAWING NO. D412-664-243 | TITLE CROSSTUBE ASS'Y (412 HI AFT) | REV. E | DART AEROSPACE LTD ENGINEERING ORDER | | D.E.O. NO. D412-664-243-E-2 | SHEET NO. SHEET 1 OF 1 | SCALE NTS |
| DRAWN <i>q2</i> | CHECKED <i>ASS</i> | MFG. APPR. <i>RE</i> | APPROVED <i>MM</i> | | DE APPR. <i>MM</i> | | |
| DATE 11.09.07 | DATE 11.09.19 | DATE 11.09.19 | DATE 11.09.19 | | DATE 11.09.19 | | |

PURPOSE:

REPLACE MAGNOBOND WITH 3M DP460 SCOTCH-WELD EPOXY ADHESIVE

859 87

CHANGE:

IS:

| Item | Qty -243 | Part Number | Description |
|------|-------------|-------------------|--------------------------------|
| 9 | A/R | SCOTCH-WELD DP460 | EPOXY ADHESIVE, 3M SCOTCH-WELD |

WAS:

| | | | |
|---|-----|----------------|---------------------------------------------------------------------------------------------------------------|
| 9 | A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE) |
|---|-----|----------------|---------------------------------------------------------------------------------------------------------------|

NOTE 12 & 16, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.**

WAS:

- 12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

RELEASED
2011-09-29
MM

